

# **Application of Taguchi method in optimization of design parameter for turbocharger vaned diffuser**

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## Purpose

The purpose of this study is to determine the best vaned diffuser design that can generate higher pressure output at a predetermined speed.

## Design/methodology/approach

Several vaned diffusers of thin, flat-type design with different number of blades and blade angle were fabricated. The vaned diffusers were fitted inside the turbocharger compressor and test on a cold-flow turbocharger test rig. A Taguchi L27 orthogonal array is selected for analysis of the data. Influence of number of blades, blade angle and rotational speed on output pressure is studied using the analysis of variance (ANOVA) technique. Finally, confirmation tests are conducted to validate the experimental results.

## Findings

The optimum design parameters of the vaned diffuser using signal-to-noise ratio analysis were six blades type, blade angle of 18° and rotational speed of 70,000 rpm. Results from ANOVA showed that the speed has the highest influence on output pressure. The number of blades and blade angle produced the least effect on the pressure output.

## Originality/value

The study used the turbocharger with the impeller size 60 mm and adapted vaned diffuser to increase the output pressure.